Light and Lighting

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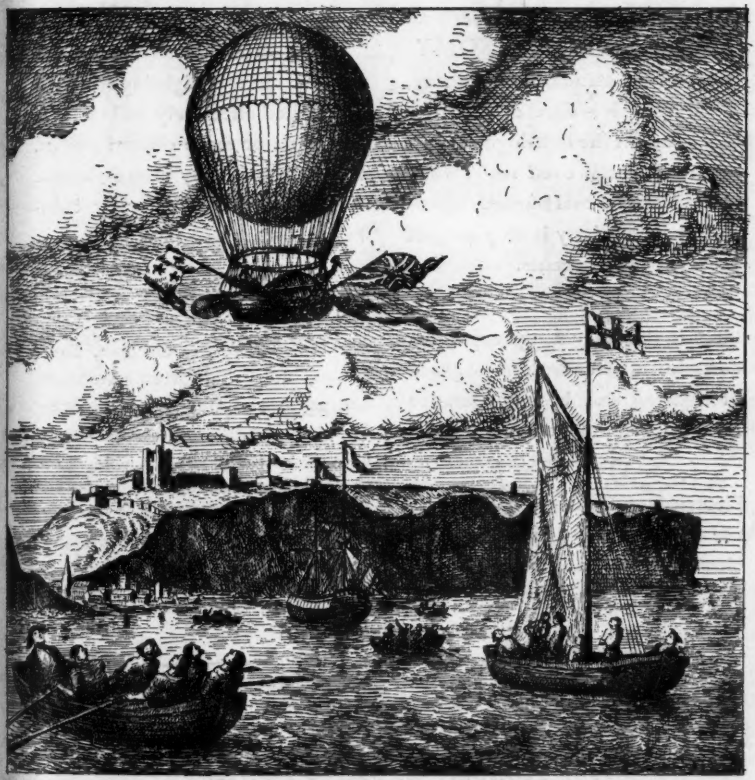

FIRST CHANNEL CROSSING BY AIR. A representation of the departure of Monsieur Blanchard and Dr. Jefferies from Dover Castle on January 7th, 1785. This was the first occasion on which the English Channel had been crossed by air.

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Light and Beauty

TRAFALGAR DAY brought Londoners a spectacle that must have cheered all who saw it. The fountains in Nelson's Square — so long inactive — sent their shimmering streams aloft once more, and, after nightfall, colour floodlights illuminated and beautified the graceful sprays. Thousands of people congregated to enjoy this welcome and nostalgic sight.

When we can discard austerity (and may that be soon!) such displays of "living colour" may become regular events, and it is to be hoped that many of the delights that exterior decorative lighting can give may not be too long denied us.

"Light," said Emerson, "is the first of painters. There is no object so foul that light will not make it beautiful." Whether we accept this dictum without reservation or not, there is no doubt that light skilfully and art-fully applied can lend beauty to buildings and other objects which otherwise are inartistic or actually ugly.

Illumination Notes and News

The Lighting Engineer

It was not unexpected that Mr. R. O. Ackerley in his Chairman's Address to the Utilisation Section of the Institution of Electrical Engineers on October 14 would deal with the work of the lighting engineer. It is well known that for many years Mr. Ackerley has taken an active part in raising the standard of lighting practice and the status of the lighting practitioner and his election to the chairmanship of this section of the Institution is an indication of the growing recognition of the importance of lighting.

In his address Mr. Ackerley pointed out that in addition to improving seeing conditions, lighting installations were being required by users to give an impression of cheerfulness. It is becoming increasingly apparent, not only from Mr. Ackerley's remarks but also from other recent discussions, that though lighting engineers have been compelled during recent years to think almost entirely in terms of efficiencies and purely functional lighting, they are now looking into the future, when it is hoped that improved power supplies will enable them to plan rather more decorative lighting than they are permitted to do at the moment. We might recall the paper given by Mr. Hubble at the I.E.S. Summer Meeting this year, in which he appealed to lighting engineers not to hesitate to add a decorative component to their lighting installations.

The chief part of Mr. Ackerley's address, however, was a plea for increased recognition of illuminating engineers by the I.E.E. Mr. Ackerley said that as the electrical profession played such a large part in the lighting industry it should be prepared to recognise the qualifications required by competent lighting engineers. He suggested that the I.E.E. should give more attention to lighting in its educational syllabus and make it possible for candidates for corporate membership of the Institution to qualify as lighting engineers just as they can now qualify in other branches of electrical engineering.

The Next I.E.S. Sessional Meeting in London

On December 14 a paper entitled *The Gas Arc—A New Light Source* will be read by Dr. J. N. Aldington at a meeting of the I.E.S. to be held at the Lighting Service Bureau, 2, Savoy-hill, London, W.C.2, at 6 p.m.

This paper will report the many years of work on discharges through gases and metallic vapours which have resulted in a water-cooled Gas Arc emitting radiation of a sunlight quality. The paper will give data on the present experimental types and will discuss possible future developments and applications.

Is Lighting News?

Apparently it is, if the outstanding success of the lecture given by Dr. J. N. Aldington, on October 26 at the Public Hall in Preston, can be regarded as any indication of the general attitude.

For two hours Dr. Aldington held

enthralled an audience of nearly 2,000, composed largely of members of the ordinary public, the only interruptions being spontaneous bursts of applause for the spectacular demonstrations with which the talk was illustrated. Dr. Aldington's subject was an historic survey of lighting development work in this country over the last 100 years.

Dr. Aldington is very well known in Preston, where he was born, and where he has worked for some 25 years. While this no doubt had much to do with the record attendance at this lecture, it by no means accounted for it all. The public is genuinely interested in lighting, and it is worth remembering that with a good speaker and attractive demonstrations there will always be audiences eager to learn more about lighting matters.

Memorial Service to the late J. S. Dow

A most impressive memorial service to the late Mr. Dow was held at the King's Chapel of the Savoy, Savoy-street, London, at 12 noon on October 19.

The service was arranged by the Illuminating Engineering Society, and amongst those present were representatives of I.E.S. Centres, organisations in the lighting industry, the professional institutions, and many others from Mr. Dow's very wide circle of friends and colleagues. The service was conducted by the Rev. Cyril L. Cresswell, C.V.O., M.A., F.S.A., who also gave the address in which he referred to the great esteem with which Mr. Dow was regarded by all who knew him and his unselfishness in devoting his life to making the world a brighter place.

It was most fitting that the service should have been held in this chapel, as Mr. Dow had been very impressed at a similar occasion in this chapel a few months ago. It is well known that Mr. Dow was a most enthusiastic gardener, and the very beautiful floral decorations in the chapel were therefore most appropriate.

The American I.E.S. National Technical Conference

Lighting engineers from this country who were fortunate enough to be in the United States at the end of September have now returned home with news of the National Technical Conference of the American Illuminating Engineering Society, which this year was held at Boston from September 19 to 24.

It would appear that there were nearly a 1,000 delegates at the conference, the programme, containing technical papers, reports on committees and social events, being a very full one.

The above picture which was taken at the Hotel Statler, the headquarters of the conference, shows, left to right, Mr. Louis G. Agostini, of Cuba; Mr. Gordon Mogford, of Crompton Parkinson, Ltd., London; Mr. E. B. Sawyer, Manager of the Lighting Service Bureau, London; Mr. T. S. Jones and Mr. A. L. Randall, of Crompton Parkinson, Ltd., London; and Mr. L. C. Kalff, General Art Director, Philips Lamps, Eindhoven, Holland.

Exhibition Lighting

By L. E. W. STOKES-ROBERTS*

The following article deals briefly with the problems to be considered when lighting an exhibition. Exhibitions vary in nature and this article deals only with the general principles.

Exhibition lighting, like many other forms of illumination, covers a very wide field. Not only is there a vast difference between *exhibition* and *display*, but there is a point where technically efficient lighting merges with the artistic. In order to simplify this article it is divided into four parts:—

(1) Display Lighting; the illumination of a specific object or objects generally to give them emphasis for sales purposes.

(2) Stand Lighting; the illumination of the area of an exhibition stand surrounded by the fascia.

(3) General Lighting; the illumination of the exhibition hall, particularly gangways.

(4) Special Effect Lighting; the illumination for effect of any special feature of an exhibition.

Display Lighting

Display lighting is taken first as this is probably the easiest to carry out. Display means the actual showing to the public of goods, or an idea to sell goods, and in nine cases out of ten the chief requirement is a high level of illumination with an absence of shadow. The illumination may be anything up to 50 foot-candles, and normally the actual lighting fitting is concealed behind a reveal or pelmet. A point which is often overlooked is the lighting of display captions; important sales points are often lost because of this.

One of the most striking forms of display in this year's British Industries Fair was a picture frame mounting behind which were two short fluorescent tubes, the articles for sale being hung on fine wires against a black background. This method is particularly effective for showing small castings. The use of the "Pepper's Ghost" principle should not be overlooked. This is very useful for demonstrating the framework of bodies, such as the steel construction of houses.

The lighting of models is of particular interest. So many models are spoilt by lighting fittings being out of scale. This is most noticeable in models having street lamps or fittings in miniature factory buildings. Though lamp manufacturers are trying to cut down their range of lamps to obtain better service and uniformity, some form of miniature lamp would be most useful to the model maker. Torch-type lamps are not satisfactory, and probably the best solution is to use normal lamps and fittings and create effect by the use of shutters and baffles. With models it is useless to think of "efficient lighting" as any model is "an effect" and, as such, must be dramatised.

The effect of coloured light on goods needs careful thought, bearing in mind that sales can be increased by creating an illusion of luxury. For instance, leather often looks well under amber light, but fluorescent lighting, being a large area source, seems to destroy the grain texture, particularly on shoes. Before the present fuel restrictions were introduced it was permissible to have changing colours on displays, which could be most effective particularly when day and night effects were used.

Display lighting is generally fairly simple to install as there is plenty of room for concealing the lighting fittings. For touring exhibitions a complete display unit which can be plugged into any lighting point can be made up.

Stand Lighting

I have seldom seen a stand at any exhibition which is well lit from both the technical and the artistic point of view. This is largely due to the fact that until recently stand-fitters went their own way and the electrician merely came along at the last minute to fix silver glass reflectors or trough fittings behind the fascias.

Glare is one of the most difficult problems to overcome, but a new type of basic stand has been designed which, when materials and labour are available, should be a great help in over-

* Lighting Consultant "Daily Mail" Ideal Home Exhibition.

coming this difficulty. Fig. 1 shows this new method of stand construction. By troughing the ceiling down with straining wires fluorescent lamps can be placed all round the stand, but a person standing in the middle and inspecting goods is not subjected to glare.

Like any normal interior lighting the first essential is to provide adequate general illumination. Electricity consumption is limited by the Ministry of Fuel and Power to 1½ watts per square foot so that the use of fluorescent lamps is practically a necessity. Bare lamps on their own should not be used. Properly designed reflectors result in greater efficiency.

Fluorescent lamps have sometimes been placed above muslin ceilings. When this is done, although a percentage of light is lost, the initial effect is a very pleasing diffused light, but after two or three days the ceilings become so dusty that up to 70 per cent. of the light is lost. The use of wooden cornices has been tried, but with the present fuel restrictions it is not satisfactory as fuel consumption is rather heavy. It is possible to provide illumination for stands by lamps concealed on the top of displays reflecting off ceilings, but this method nearly always results in very poor lighting of the goods themselves.

Once a stand has been lit as shown in Figure 1 special features can be picked out by using 150-watt silver glass reflectors or 250-watt theatre-type spotlights carefully positioned to avoid glare.

The hanging of trough-type fluorescent lamps over the centre of stands is to be deprecated as not only do they look rather clumsy but their use means cutting holes in the muslin ceiling which tend to extend if any tension is placed on the muslin.

On a stand of over 20 ft. square the centre portion does present a problem, but in most cases there is a display feature which can be designed to include some lighting fittings for general stand illumination.

When a stand portrays a room in a house it should be treated as a model, as it is impracticable to light it with the lighting fittings which would be used in the room in actual practice. The reason for this is that the lighting fittings are designed to throw the light where required by the occupants for reading, typewriting, etc., but when the room is looked at, as it were through the window, additional lighting must be installed behind the fascia of the stand to give the necessary brightness.

General Lighting

The general lighting of an exhibition is often overlooked. When all stands are illuminated and the workmen are putting the finishing touches to the decoration an exhibition hall looks gay and inviting. As with amplificaton installations, however, the entrance of the public creates a new problem. As spill light across gangways is cut off fascias become dull and the exhibition seems to lose some of its brightness. Good overhead lighting, as at Olympia, solves this problem, but illuminated fascias still further improve it.

Figure 2 shows a special plaster fascia designed by Douglas L. Dick, F.R.I.B.A. By adjustment of the curve the fascia letters are lighted to a very high level of illumination. Light passes through

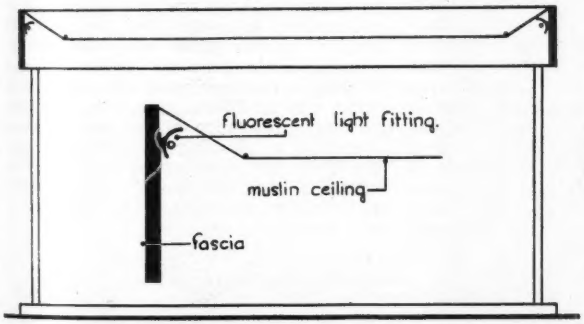


Fig. 1. Showing a new type of exhibition stand designed to minimise glare from stand lighting fittings.

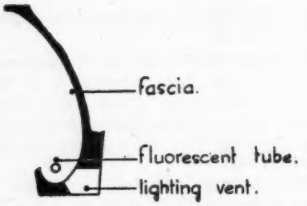


Fig. 2. Plaster fascia designed by Douglas L. Dick, F.R.I.B.A.

the slots to aid general stand illumination and the gangways are lit by reflected light.

If a very theatrical effect is required the gangways of an exhibition can be kept dark, but as a certain amount of lighting must usually be installed to comply with local regulations this effect is difficult to obtain.

It is often asked whether it is possible to light an exhibition with general lighting alone. The answer is that whereas it is not entirely satisfactory, a reasonable effect can be obtained by simple overhead lighting provided stands have no ceilings and fascia boards are dispensed with.

Two interesting points arise in general lighting. Firstly, if the general lighting is incandescent and the stand lighting is fluorescent, the two mix reasonably well and the effect is pleasing. Usually, unless a special effect is required, general lighting should be of the same type throughout the exhibition as a change from incandescent to fluorescent gives a very marked change of mood. Use was made of this effect in the 1948 Ideal Home Exhibition when a figure of Nelson was lit with daylight fluorescent lamps, but the rest of the floor with warm white fluorescent or incandescent lamps. The figure looked cold—just as if the area was open to the sky.

A further interesting point in connection with general lighting is the effect of the building itself. At Olympia a visitor enters under a glass roof and illumination values are comparable with the daylight outside, whilst at night the roof is often left unlit so that the effect is still natural.

At some exhibition halls, however, it is essential to light the roof during the day or a depressing effect results. This psychological aspect only applies where the interior of the exhibition hall attempts to assimiliate a normal effect, as, if the exhibition tends towards the dramatic, during the daytime the feeling is probably accentuated in the same way as the darkened auditorium of a theatre. This problem has been solved on occasions by suspending all the stand lighting fittings above the muslin ceiling so that the reflected light brightened the ceiling and minimised the contrast value.

Special Effect Lighting

The lighting of features and special exhibits is one of the most important aspects of any exhibition. Without features an exhibition becomes merely a collection of shops or booths. No rules can really apply to this type of lighting, although the problems are many. The following are a few examples of special effects lighting, which give some idea of its scope; many more could be quoted, but space does not permit.

Garden Section of Ideal Home Exhibition

Several methods were tried without success, and eventually the ceiling was troughed and lighting units installed, as shown in Figure 3. With blue muslin this gave a most realistic effect. It is interesting to note that lamps with amber screens gave the best result. Fluorescent lamps were used in 1948 and effected a fuel saving of over 60 kw. on what was an 88-kw. load, but the result on the appearance of the gardens was not quite so pleasing. A certain famous gardener has commented that a better effect is obtained under incandescent light than in the natural setting of

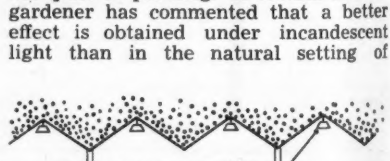


Fig. 3. Arrangement of lighting fittings and ceiling for the garden section of the Ideal Home Exhibition.

Chelsea. This is an interesting example of light selling the goods.

Court of Fashion, 1947, *Ideal Home Exhibition.*

Sixteen stages were designed by Jean St. Martin, the mannequins being of

Fig. 4. Court of Fashion, Daily Mail Ideal Home Exhibition, 1947.

wire mesh. (See Figure 4.) Each stage was lit like a theatre with cyclorama background and spots in foreground, and the effect was stark but dynamic. Loads were heavy, up to 12 watts per square foot of actual stage area.

Victoria Falls, Empire Exhibition, Glasgow, 1938.

The replica of the falls was 110 ft. long and 16 ft. high, and water was pumped over it at the rate of 40,000 gallons a minute. The lighting was chiefly from concealed lengths of three-coloured battens—one below a false horizon on the top of the falls, and the other in a cove immediately above the spectators. Additional floodlights were concealed in the jungle foliage in front of the falls, to give more brilliance to the actual water. The roof of the exhibit was, in fact, the equivalent of a theatre cyclorama. By the use of magnetic clutches, shown in Figure 5, a complete cycle of day and night was reproduced. The effects side of this exhibit was very comprehensive, and included stars, moving clouds, rain effect and a rainbow.

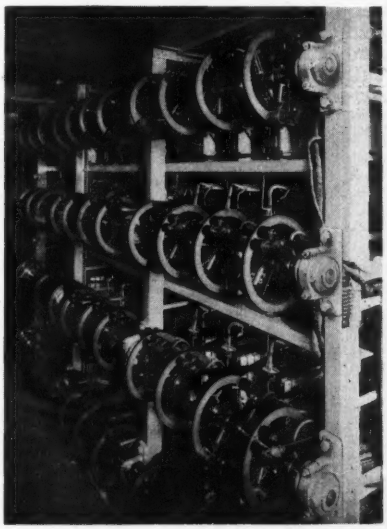
Conclusion

The above comments are an attempt to cover rather briefly the subject of exhibition lighting as such but a few notes on cost may be of interest.

I am often asked how much does it cost to light a stand. Ignoring special or trick effects, as a general rule 2s. per square foot is a fair average. This covers a four-week exhibition, and is based on lighting at 1½ watts per square foot, which is the maximum allowed, but which, if used intelligently, will provide adequate illumination.

The great difficulty of exhibition construction work is the fight against time. Seldom is it possible to have more than two weeks for erection; often much less.

Within the next few years we may well see a great improvement in exhibition lighting, but as a first step the stand designer must get into the habit of consulting the lighting engineer before he has gone too far with his plans.



(By courtesy of The Strand Electric and Engineering Co., Ltd.)

Fig. 5. Magnetic clutch type dimmer bank.

The Diffusion of Light

The subject considered at a joint meeting of the Colour and Optical Groups of the Physical Society, held at the Northampton Polytechnic on Wednesday, October 13, was one not unfamiliar to readers of LIGHT AND LIGHTING. Many will remember Mr. Waldram's paper on the photometric properties of the atmosphere, read before the Illuminating Engineering Society some three years ago. In this, he discussed the scattering of light from mist and other atmospheric particles, and two of the five papers read at the Northampton Polytechnic were concerned with this kind of diffusion. The first paper, however, dealt with the subject in a more general way, the author, Mr. E. W. H. Selwyn, taking in turn the four different ways in which light might be scattered, viz., by diffraction at the edges of apertures, by reflection or refraction at unsmooth surfaces, by resonance from very small particles, and by atomic processes such as those responsible for the Raman effect. He said that in every case the light emerging from the scattering medium could be regarded as composed of two parts, viz., a specular, or regular, component exactly similar in character to the incident light but reduced in intensity, and a diffuse component arising from the scattering effect. It was pointed out in the discussion, however, that the regular component might well be very small and that the distribution of the scattered light was usually quite different from that reflected by a perfect diffuser.

In the second paper, Dr. W. S. Stiles dealt with the subject from the point of view of calculation, and showed how it was possible to find the distribution of light from a plane parallel layer of the scattering medium when this was illuminated oither by parallel light or by completely diffuse light. He said that, even when the transmission was high, multiple scatter accounted for a considerable proportion of the total scattered light.

Dr. G. B. Harrison gave a very interesting account of the effect of haze on photography from the air at night. He said that such aerial photographs were taken by the light of a flash bomb dropped free from the aircraft and fused to explode after a predetermined interval, i.e., at a selected altitude. This flash bomb necessarily illuminated the haze between the camera and the ground, so that light was scattered by the haze into the camera and reduced the contrast in the picture. It was possible, said Dr. Harrison, to find by calculation the best position for the bomb to explode, relative to the aircraft and the ground.

An excellent résumé of the various effects of light scatter in photographic materials was given by Mr. D. T. R. Dighton. Such diffusion, he said, acted in two ways; during exposure it reduced the sharpness of the image and after development it influenced the effective opacity according to the way in which the negative was illuminated. This was the effect studied by Callier and others since this time, and the relations between "specular" and "diffuse" density were of considerable interest. Both could be measured by suitable means which Mr. Dighton outlined. He said that comparatively little was known about the diffusion of light in undeveloped materials. This matter was subsequently discussed by Mr. Walters and Mr. Selwyn.

The last paper was that of Mr. F. North, who took as his subject the scattering and absorption of light in coloured paper. Some time ago Kubelka and Munk put forward a theoretical treatment of the relation between the scattering power of a diffusing material and the effect of thickness on the reflection factor of a thin layer of it. Mr. North described an attempt to use this theory to obtain information on the physical state of the dyestuff precipitate in coloured paper. Graphical and approximate methods of solution were applied to the equation of Kubelka and Munk, an equation of somewhat daunting appearance. The experimental results described by Mr. North showed that absorption coefficient and dyestuff concentration were linearly related, within limits, and that deviations from this linearity indicated changes in the physical form of the precipitated dyestuff. Variables in the colouring process could markedly change the value of the absorption coefficient for a given dyestuff concentration.

The papers were taken in two sessions, each concluding with a short discussion.

The I.E.S. visitors with Mr. L. J. Davies and members of the laboratory staff.

The B.T.H. Research Laboratories

A party of over 30 members of the I.E.S. led by their President, Mr. J. M. Waldram, visited the Research Laboratories of the British Thomson-Houston Co., Ltd., at Rugby on October 21. On arrival they were welcomed by Mr. L. J. Davies, Director of Research, and entertained to lunch before breaking up into groups to make a tour of the laboratories.

The progress of work on compact source discharge lamps was seen and the improved colour rendering properties of these lamps was demonstrated. In the photometry section the use of the 6-ft. standardising integrating photometer was explained whilst in the colorimetry section the visitors were able to see the checking of lamps in the fluorescent lamp colorimeter. In the glass research laboratory visitors were given some idea of the problems encountered in making seals, particularly in the new ranges of discharge lamps which are now being developed. Some simple but very effective demonstrations were made to show how u.v. radiation is absorbed by glass.

In the lighting applications laboratory the visitors were shown the procedure for plotting intensity distribution curves of lanterns. The majority of the party were no doubt surprised to find how much work had been carried out on the adaptation of fluorescent lighting for use in transport vehicles. The party were also shown the various workshops associated with the laboratory work and finished up in the new photometric building which is just being equipped.

After tea Mr. Waldram, on behalf of all the visitors, expressed sincere appreciation to Mr. Davies and the members of his staff for the excellent way in which the visit had been

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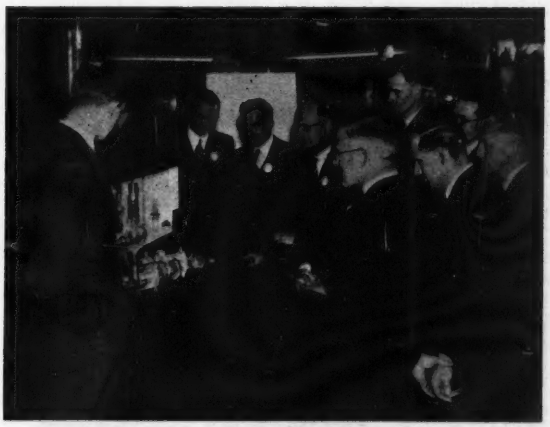


Mr. E. J. G. Beeson describing the development of studio spot lamps.

New Lighting Installations

An installation, recently completed in the Library of the Royal Society of Medicine, presented a number of typical planning problems. Firstly, it was necessary that the lighting should facilitate the visual task while maintaining the right atmosphere; and secondly, design and lay-out had to be related to the architectural form of the room. The illumination had to be such that the title of any book on its shelf, even at floor level, could easily be read. To achieve this a vertical illumination in the order of 3-4 lumens per sq. ft. was necessary at floor level. It was thought that if this could be achieved the horizontal illumination at the reading tables would also be adequate. This is, in fact, approximately 18 lumens per sq. ft.

General illumination is provided by nine lanterns mounted on the ceiling, each enclosing six 80-watt fluorescent lamps, four of which are "daylight" lamps and the other two "warm-white." The lanterns themselves are made of wood and glazed in moulded "dew-drop" glass, and are approximately 11 ft. long, 2 ft. 6 in. wide, and 12 in. deep.

The presence of a gallery running right around the Library, with bookshelves almost to ceiling level, necessitated a very good horizontal distribution from the fittings, thus making it imperative that they be mounted on the ceiling itself.

Designed by lighting engineers of the B.T.H. Co., Ltd., the fittings in this famous Library, which is visited by doctors and students of all nationalities, were fabricated and erected by Messrs. E. Pollard and Company, Ltd.

The Library at the Royal Society of Medicine.

Fluorescent Lighting in an Air Liner

In equipping an Avro "York" aircraft for service between Miami, Florida, and Nassau, in the Bahamas, British South American Airways has adopted fluorescent lighting as a major contribution towards attaining the required standard of passenger comfort. This is believed to be the first fluorescent installation in a "York." The installation should do much to maintain the popularity of this type of aircraft among an exacting passenger clientele that is of importance to British economy as a source of dollar revenue.

The main lighting comes from 12 Osram 2-ft. 20-watt fluorescent lamps in two parallel rows of ceiling fittings. There is also a similar lamp to light the entrance, and one in each toilet—a total of 15 lamps. All are of daylight colour, which was chosen because its cool effect is pleasing in the hot climate of this part of the Atlantic. The lamps operate on a 110 V. 400-cycle three-phase supply obtained through a rotary converter from the aircraft's 24 V. circuit. The equipment supplied by the

Above :—Interior view of the York aircraft showing a fluorescent fitting in the entrance and the lighting of the passenger cabin.

Right :—One of the accounts offices showing on the left a special gallery fitting which has glass fillets for illumination by reflection from the ceiling.

G.E.C. for this special installation comprised the lamps, bi-pin holders, chokes, condensers, starters, and Pirelli-General P.G.C.A. glass-braided flexible cable for all wiring to the lamps.

Office Lighting

When office buildings are planned with extensive window space to enable the maximum advantage to be taken of daylight, it is particularly important for the lighting installation to be designed so that a similar quality of illumination is enjoyed when daylight fades. The General Electric Co., Ltd., has recently completed a hot cathode fluorescent installation at the Central Accounts Offices of the South-Eastern Electricity Board, Surbiton, in which these conditions were obtained by fittings of special design. The lighting effect produced is similar to that obtained from a cloudy sky during the summer months, both in quality and direction. In the larger offices the main illumination comes from three-lamp cornice trough reflector fittings, with white flashed opal glass panels, containing two 5-ft. 80-watt "daylight" and one 5-ft. 80-watt "warm-white" lamps. By combining the two colours an effect is obtained which is kind to the complexion and is appreciated when numbers of women are employed.

The planning of the whole installation is such as to give an immediate and welcome impression of adequate lighting, without emphasis on the location

of the actual light sources. The technique employed is directional in effect and as far as possible the direction of the lighting conforms with that of the natural lighting received in the daytime. The scheme now completed was initiated by the late London and Home Counties Joint Electricity Authority.

Factory Lighting

A planned fluorescent lighting installation to suit the eventual bench layout has been achieved in the new factory under construction at Bathgate, Glasgow, for the Telegraph Condenser Co., Ltd., utilising over 650 Ekco-Ensign 5-ft. 80-watt fluorescent fittings. In the condenser assembly bay shown in the accompanying illustration, the fittings are mounted in even rows with 14 ft. 6 in. between each lamp and 8 ft. 6 in. between rows giving balanced overall lighting with no dark areas.

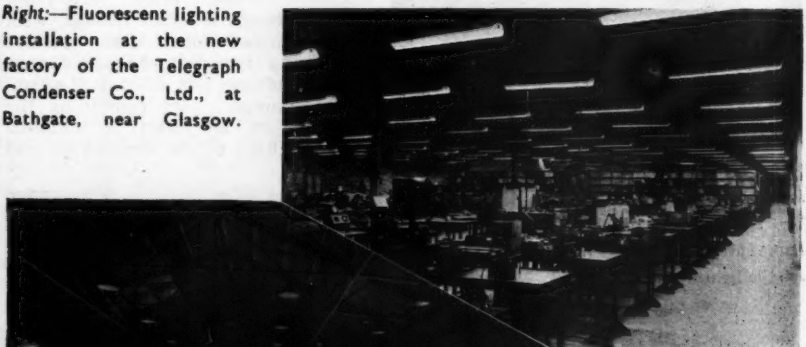
The metal reflectors of this fitting have maximum light output below the horizontal with a dispersive distribution and a 20-degree cut-off and are placed at a height of 11 ft. above floor level giving an illumination on the working plane of 10/11 lumens per sq. ft.

Messrs. Donald Smith and Partners, of 7, Royal Bank-place, Glasgow, C.1, were the consulting engineers for the installation.

Lighting in the Motor Industry

It is interesting to note that lighting was included in the exhibits at the recent Motor Show at Earls Court, where the Benjamin Electric, Ltd., showed their latest lighting equipment.

The exhibits included lighting equipment for use in factories, garages, and service stations, and included a new range of "Flurolier" trough reflectors finished with the "Crysteel" vitreous enamelling process. The new types included troughs having apertures to permit a percentage of upward light. Also on view were high bay and stock bin units.



Right:—Fluorescent lighting installation at the new factory of the Telegraph Condenser Co., Ltd., at Bathgate, near Glasgow.

Left:—A view of a special lighting scheme carried out by The Benjamin Electric, Ltd., for the M.G. Car Co. at Abingdon.

Lighting and Industrial Medicine

The International Congress on Industrial Medicine, which was held—for the first time in London—from September 13 to 17, was noteworthy for the fact that, also for the first time, special sessions were devoted to the subjects of Lighting, Industrial Ophthalmology, and Colour Vision in Industry.

Lighting and Vision

At the session on Lighting, the speakers were Mr. H. C. Weston, Dr. G. S. Fortuin (Holland) and Dr. S. W. Fisher, Chief Medical Inspector of Mines. In his paper on "Illumination in Relation to Visual Tasks," Mr. Weston outlined the work done in this country to provide a scientific basis for industrial lighting practice, and to secure the statutory regulation of lighting in factories. Early attempts, he said, to formulate mandatory standards were made with the view of requiring the maintenance of conditions consistent with "reasonable" health and safety of workers, but not until 1937 did it become compulsory to provide "sufficient and suitable" lighting in all factories. During the past 20 years, research has been directed to ascertaining optimum rather than minimum permissible conditions of lighting, taking efficiency in performing the visual tasks imposed by factory processes as a criterion.

In dealing, briefly, with some of the most recent studies showing how visual performance varies with illumination, and with variation of the features common to all visual tasks, e.g., size and contrast, Mr. Weston pointed out that the results of these scientific investigations are taken into account in the current I.E.S. Code. The recommendations of the Code are being implemented in much post-war lighting practice. Referring to fluorescent lighting, Mr. Weston said that its introduction to vital factories, during the recent war, provided the most acceptable substitute for natural daylight, where the latter was excluded or seriously curtailed, to facilitate defence. Since the war there has been a certain number of complaints that this lighting has deleterious effects upon sight and general health. In those cases which had come to him for investigation he had found nothing to support the suggestion that fluorescent light is harmful, though there was cause for dissatisfaction on account of unskilful design of the lighting installations and lack of proper maintenance. These causes of dissatisfaction are, of course, often present where other illuminants are used, and even when windows are the light sources. In the concluding part of his paper, Mr. Weston summarised the results of his recent study of the effect of age and illumination on visual performance, and pointed out that the advancing age of the industrial population should not be ignored in deciding standards of illumination, especially for "fine work."

Dr. Fortuin, in his paper on "The Effect of Illumination and Age on Visual Acuity," described an interesting instrument he has devised for determining visual acuity while taking into account the effect of the contrast presented by the test objects. He had analysed the results obtained from his "subjects" so as to show the decline of acuity with advancing age and the increased light-need of older subjects in order to attain a given degree of acuity.

Dr. Fortuin suggested that the terms "visibility" and "contrast sensitivity" are superfluous, and that probably "visual power" can be defined as "visual acuity in different situations," so that every effect of illumination, glare, types of light, colour, age, etc., on the visual power can be measured as an increase or decrease of the visual acuity. It is possible to calculate illumination levels on a physiological basis for each type of fine work, if the relation between the required minimum visual acuity and the visual acuity needed for easy seeing is known. Dr. Fortuin said that this relation is the subject of further investigations upon which he is engaged, but he referred to tentative conclusions reached by relating his measurements of acuity at different levels of illumination to Mr. Weston's published observations showing the variation of visual performance with illumination.

Dr. Fisher's paper was concerned with the lighting of mines. By way of introduction, he described the mechanism of vision, with particular reference to seeing in dim light. He then exhibited various types of miner's hand-lamp, as well as the cap-lamp, and said that the

use of the latter is rapidly extending. Nevertheless, mains-lighting at the coal-face is necessary to provide desirable levels of illumination, and Dr. Fisher described recent experimental installations of fluorescent lighting underground, and gave a demonstration of the excellent effect produced.

Industrial Ophthalmology

During the session devoted to Industrial Ophthalmology, the principal speaker, Dr. Hedwig Kuhn (U.S.A.), stressed the need for good lighting in factories in order that work may be done without eye-strain. Dr. Doesschate (Holland) read a paper in which he suggested that the domain of the industrial ophthalmologist should extend far beyond the restricted region of eye accidents and occupational eye diseases. Briefly, it should include "job analysis," selection based on specialised ophthalmological examination, correction of defects, advice on lighting and on protective measures.

Several speakers in the discussion, including Dr. Currie (Cheltenham) and Mr. H. C. Weston, pointed out how necessary it is that ophthalmologists should familiarise themselves with industrial operations if they are to be able to recommend the most suitable means for facilitating particular visual tasks. Mr. Weston said it is not always understood that even young persons' eyes are "too old"—in the sense that their near point of distinct vision is too remote—for them to do certain visual tasks comfortably and efficiently without some optical aid, as well as excellent illumination. It is only by careful appraisal of visually difficult industrial operations that it can be decided whether better lighting, optical aid, or some modification of the work-objects themselves, is the most readily applicable, or the most effective, way of easing the work.

Colour Vision

On the last day of the Congress there was a session devoted to a symposium on colour vision, under the chairmanship of Prof. H. Hartridge. Papers were presented by Prof. W. S. B. Riddell (Glasgow), Dr. W. D. Wright, and Dr. L. Norman, while Prof. Hartridge himself described a proposed colour blindness test he has recently devised. The existence of individuals with defective colour vision does not seem to have excited notice until the eighteenth century, and, according to Prof. Riddell, it would appear as if such persons were not found to have difficulties until the introduction of signal lights about a century ago, although coloured symbols, e.g., flags, have been used for purposes of recognition throughout the ages. Prof. Riddell suggested that probably the greatest menace to public safety arises from acquired colour defects, such as occur in tobacco amblyopia. This is usually found in middle-aged and elderly men, who may be extremely confident of their experience and skill. Such men are dangerous, and medical officers of industry should be watchful for them. In his paper on "Defective Colour Vision in Industry," Dr. W. D. Wright pointed out that the important practical difference between a normal observer and a colour defective observer is that the total number of colours which the latter can recognise as distinct from one another is significantly smaller than the number distinguishable by the former. Some ranges of colour are more readily confused than others, but the defect varies both in type and degree. Dr. Wright dealt with the Report published recently by the Physical Society Colour Group on Defective Colour Vision in industry, and said that, since some 4 to 8 per cent. of males are defective in colour vision, prevocational tests are highly desirable and might be undertaken either at school or by particular industries. The Isihara or the Rabkin test is recommended for general purposes, but should be supplemented where appropriate by a suitable trade test.

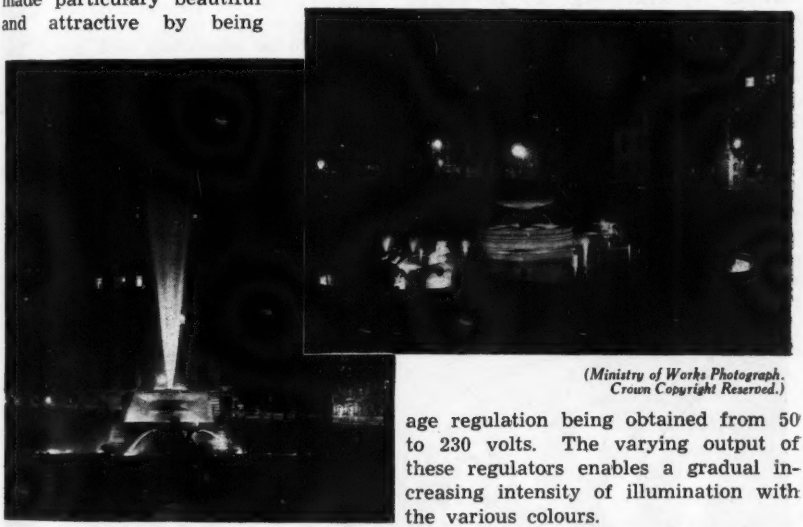
Speaking on "Industrial Aspects of Colour Vision," Dr. Norman said that colour vision is becoming increasingly important in industry. Improvements in the methods of testing colour vision may result in the detection of an increased proportion of colour-defective individuals, and there is need for accurate assessment of the degree of an individual's colour defect in relation to his employment; the degree of colour perception required in each occupation concerned should be examined. Dr. Norman discussed acquired defects of colour vision, including those due to advancing age, and he pointed out that the incidence of defective colour vision in females is by no means negligible, especially where safety considerations may be concerned.

Floodlighting in Trafalgar Square

One of the most popular features of the reconstructed Trafalgar Square, which has just been reopened, is the floodlighting of the fountains, the Square, and of the Nelson statue. This unaccustomed display of light and colour has proved a great attraction to Londoners and visitors to London since it was switched on on October 21.

The lighting of the fountains is made particulary beautiful and attractive by being possible in a range of four colours, and where more than one colour is used the colours can be changed automatically by fading one into the other every 30 seconds. The fittings used for lighting the outer and centre bowls are of the marine heavy duty type, having a beam angle of 34 deg., and using 200-watt G.S. lamps. For the top bowl special shallow fittings having a 30 deg. to 40 deg. high intensity beam were made. These fittings were designed and made by the Ministry of Works Engineering Division specially for this job, and consist of a trough type exterior with a thick "Perspex" window. Two short S-type bends at either end of the fittings serve both for a waterproof cable entry and for ventilation. The fittings are designed to take either 500-watt or 1,000-watt G.S. lamps or line filament lamps. The centre jets are illuminated by watertight fittings with 200-watt lamps.

The colour-changing mechanism used on these fountains is of interest. Two standard type voltage regulator transformers were modified to meet the requirements of the installation, their total output being 24-kw. working load, voltage regulation being obtained from 50 to 230 volts. The varying output of these regulators enables a gradual increasing intensity of illumination with the various colours.



(Ministry of Works Photograph. Crown Copyright Reserved.)

The lighting of flower beds is always a source of attraction, and the lighting of those in Trafalgar Square is no exception. A general type of trough lighting, having a rating of up to 60 watts per foot run, is used for the flower beds, whilst specially selected spot lights are used in the shrubbery.

Visible at some distance from the Square itself is the statue of Nelson at the top of the column, which is illuminated by two floodlights using 20-in. parabolic reflectors and 1,000-watt G.S. lamps. Special searchlights can be used to supplement these units if necessary.

I.E.S. ACTIVITIES

Cardiff Centre

One of the foremost aims of the I.E.S. Cardiff Centre is to provide lectures covering a wide field of subjects, and thereby "spread the gospel" of good lighting to a comprehensive cross-section of the general public in all walks of life.

It is felt that this policy achieved some success at the fifty-fifth Sessional Meeting, held at The South Wales Institute of Engineers, Cardiff, on Thursday, October 7, when Mr. M. W. Peirce, F.I.E.S., and Mr. D. J. Reed, presented their paper, "General and Specialised Hospital Lighting." This subject provides great scope and unfortunately has received but scant attention from lecturers in recent years; Messrs. Peirce and Reed have done quite a lot to make up for this apparent neglect in providing a paper which is full of interest from beginning to end. The method of presentation was rather a new departure, Mr. Peirce presenting the problems and Mr. Reed dealing with them in a most interesting manner.

An audience of 44 enjoyed a thoroughly interesting lecture, but the high spot of the evening was provided by one of the most enthusiastic discussions for some time. The contribution of Dr. Hywel Roberts, Medical Superintendent of Woolaston House, Newport, Mon., was enthusiastically applauded, as this speaker raised many interesting points which would only be apparent to the surgeon, physician, or nursing staff of a hospital, such as portable lamps for urgent operations, e.g. blood transfusions,, when the patient may be too ill to be removed from the ward, such lamps to be absolutely fool proof, free from glare which may distract other patients, or inconvenience the surgeon or nursing staff, and if possible devoid of trailing cables. The question of lighting the interior of sterilising cabinets, without damage being caused to lamps and fittings by unavoidable clouds of steam, was also a point of immediate importance to the hospital staff.

It was also of great interest to have the opinion of surgeons, anaesthetists and nursing staff on the suitability or otherwise of fluorescent lighting for

Group taken at the Annual Dinner of the I.E.S. Cardiff Centre on October 8th. Mr. S. G. Turner, Chairman of the Centre, is in the centre of the front row.

hospital use, the concensus being most varied, likes and dislikes being determined by most unexpected and unusual factors. The engineering and maintenance staffs of several hospitals were also represented.

On the following evening, October 8, the Cardiff Centre held their third annual dinner and dance at the Royal Hotel, Cardiff. Amongst the guests on this occasion were the president and secretary of the I.E.S. and Mr. L. Howles, chairman of the South Wales Electricity Board. Mr. S. G. Turner, chairman of the Centre, presided.

In the speeches which followed the dinner the toast of the I.E.S. was proposed by Mr. H. Coope, a past chairman of the Western Centre of the I.E.E., who recalled the formation of the Cardiff Centre in 1938 under the chairmanship of Mr. Edward Jones. He said that the Centre has been active in promoting the proper use of lighting and he also made reference to the lectures to school children in South Wales which had been undertaken by the Centre.

In replying to this toast Mr. Waldram referred to the losses which the Society had sustained of recent months, including professor David Jones, who had done so much for the Cardiff Centre. It was such men, he said, who had built the Society, and it was up to those who remained to keep the good work going. He was particularly pleased that the Cardiff Centre were taking part in the increasing educational activities of the I.E.S. and said that it was a very healthy sign that the younger men were now anxious to take the recognised examinations in order to get on in the profession. The lighting engineers' job, however, was not just one of science alone; one of its features was the need to understand people, as the lighting engineer was brought in contact with all kinds of people from all walks of life.

The toast of "The Guests" was proposed by Mr. J. S. Liversage in a very amusing speech, the reply being made by Mrs. S. G. Turner.

Leeds Centre

At the opening sessional meeting of the Leeds Centre on October 11, Mr. E. A. Fowler relinquished the chairmanship of the Centre to Mr. J. D. Green, who made his inaugural address. In his address Mr. Green said that although lighting engineers had been able to establish and maintain reasonable standards of lighting as far as quantity, and to a certain extent quality, was concerned, they had so far given little attention to the use of lighting as a means of providing pleasure. This was particularly noticeable in such interiors as hotels and restaurants where the use of light as an amenity was most important.

Mr. Green said that he looked forward to the day when the lighting engineer would be as much concerned with the use of light for decoration as he is at the moment with providing specified levels of illumination. He referred to the need

(*Continued on p. 247*)

Picture taken at the Birmingham Centre's Ladies' Night on September 30. The picture includes Mr. and Mrs. C. J. Allderidge, Mr. and Mrs. F. S. Ette, Mr. and Mrs. W. P. J. Watson, Mr. and Mrs. Howard Long and Miss Long, and Mr. and Mrs. R. Mackenzie.

Forthcoming I.E.S. Meetings

(Provisional List)

MEETINGS AND VISITS IN LONDON

1948.

Dec. 8th. Informal Meeting. Report and discussion on the 1948 meeting of the International Commission on Illumination. (*At Gas Industry House*, 1, *Grosvenor Place, S.W.*1.) **6 p.m.**

Dec. 14th. Sessional Meeting. DR. J. N. ALDINGTON on **The Gas Arc—A New Light Source.** (*At the Lighting Service Bureau*, 2, *Savoy Hill, W.C.*2.) **6 p.m.**

1949.

Jan. 11th. Sessional Meeting. MR. H. R. RUFF, MR. J. N. HULL, and MR. R. V. MILLS on **Transport Lighting with Fluorescent Lamps.** (*At the Lighting Service Bureau*, 2, *Savoy Hill, W.C.*2.) **6 p.m.**

Jan. 26th. Informal Meeting. Discussion on Lighting in Coal Mines. (*At Gas Industry House*, 1, *Grosvenor Place, S.W.*1.) **6 p.m.**

MEETINGS OF CENTRES AND GROUPS

1948.

Dec. 1st. MR. W. A. DODGSON on **Some Unusual Lighting Installations.** (*At the Minor Durant Hall, Oxford Street, Newcastle upon Tyne.*) **6.15 p.m.**

Dec. 2nd. MR. W. H. WILLOTT on **Glass in Projection Systems.** (*At Exeter.*)

Dec. 3rd. MR. W. A. R. STOYLE on **Maintenance of Fluorescent Lamps and Auxiliary Gear.** (Joint meeting with the E.C.A. and A.S.E.E.) (*At the Imperial Hotel, Temple Street, Birmingham.*) **6 p.m.**

Dec. 3rd. MR. W. H. WILLOTT on **Glass in Projection Systems.** (*At the Grand Hotel, Bristol.*) **7 p.m.**

Dec. 3rd. MR. P. L. ROSS and MR. F. WIDNALL on **Lighting of Coal Mines.** (Joint meeting with the Association of Mining, Electrical and Mechanical Engineers.) (*At the City of Nottingham Gas Department Demonstration Theatre, Parliament Street, Nottingham.*) **5.30 p.m.**

Dec. 3rd. MR. P. CORRY on **Light and Colour on the Stage.** (*At the Electricity Showroom, Market Street, Huddersfield.*) **7.15 p.m.**

1948.

Dec. 6th. MR. A. HADDOCK on **Organisation of Electricity Supply to the City of Sheffield.** (Joint meeting with the E.C.A. and E.A.W.) (*At the Medical Library, The University, Western Bank, Sheffield*, 10.) **6 p.m.**

Dec. 7th. MR. G. E. CHAMBERS on **Mine Lighting.** (*At the Lecture Theatre of the British Electricity Authority's Showroom, Whitechapel, Liverpool*, 1.) **6 p.m.**

Dec. 7th and 8th. Lectures to Schoolchildren. (*At the Large Hall, Technical College, Queen Street South, Huddersfield.*)

Dec. 8th. MR. S. G. TURNER and MR. W. A. COOPER on **The Manufacture of Tungsten Filament and Electric Discharge Lamps.** (Joint meeting with the Mid-Glamorgan Scientific Society.) (*At the Mining and Technical Institute, Cowbridge Road, Bridgend, Glam.*) **7 p.m.**

Dec. 9th. MR. F. JAMIESON on **Office and School Lighting.** (*At the Demonstration Theatre, East Midlands Electricity Board, Charles Street, Leicester.*) **6.30 p.m.**

Dec. 9th. MR. F. V. HAUSER, DR. F. S. HAWKINS, MR. W. R. STEVENS on **Film Studio Lighting.** (*At the Reynold Hall, Manchester College of Technology, Sackville Street, Manchester.*) **6 p.m.**

Dec. 13th. MR. J. W. HOWELL on **School Lighting.** (*At the No. 4 Sub-Area Offices, Yorkshire Electricity Board, Whitehall Road, Leeds* 1.) **6 p.m.**

Dec. 16th. DR. W. E. HARPER and MR. H. P. WALKER on **Acrylic Plastics in Lighting.** (*At the Institution of Engineers and Shipbuilders in Scotland*, 39, *Elmbank Crescent, Glasgow, C.*2.) **6 p.m.**

Dec. 16th. MR. H. L. PRIVETT on **The Latest in Electric Lamps.** (*At No. 1 Sub Area Office, Yorkshire Electricity Board*, 45–53, *Sunbridge Road, Bradford.*) **7.30 p.m.**

Dec. 17th. DR. W. E. HARPER and MR. H. P. WALKER on **Acrylic Plastics in Lighting.** (*At the Heriot-Watt College, Chambers Street, Edinburgh.*) **6.30 p.m.**

Dec. 22nd. MR. N. HUNTER on **Technical Films of General Interest.** (*At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.*) **6.15 p.m.**

(Secretaries of Centres and Groups are requested to send in particulars of any changes in programmes, mentioning subject, author, place, date and time of meeting: summaries of proceedings at meetings (which should not exceed about 250–500 words) and any other local news are also welcome.)

(*Continued from p. 245*)

for closer liaison between architects, electrical contractors and lighting engineers so that all aspects of a lighting installation can be discussed at the ealiest stages.

Mr. Green advised all young lighting engineers to concentrate on the provision of quality with every lighting scheme so that the profession would leave no doubt in the minds of prospective users as to the high standards to which lighting engineers work.

Manchester Centre

The Manchester I.E.S. Centre opened the new session on October 14 with a luncheon meeting at which the principal guest was the Lord Mayor of Manchester, Alderman Mary L. Kingsmill Jones, O.B.E., M.A., J.P. The chair was taken by Mr. H. Atherton.

Mr. Atherton, in proposing the toast of the City of Manchester, said it was the first occasion on which the Centre had been honoured by the presence of the Lord Mayor. The city, he said, had always been forward in education, art, science, and public services, and though the amenities of the city had, perhaps, left something to be desired in the past there was no doubt that the present administration was determined that future generations should take over a city brighter than it is now generally acknowledged to be.

In reply, the Lord Mayor thanked the Centre for their warm welcome. Referring to the city she said that some people thought it looked better at night, but if that was so then it was a tribute to the lighting fraternity. The war had taught us all the value of light and the great part that it played in our lives. She was particularly interested to hear of the work of the I.E.S. in connection with the lighting of schools and libraries, which were of such importance to local authorities. The war, she said, had unfortunately interrupted much progress in these fields, but the local authorities were doing their best and welcomed the help of members of the I.E.S.

The toast of the I.E.S. was proposed by Miss N. Kenyon, of the North Western Electricity Board, who said that in her opinion lighting was more a matter of art than of engineering and the Society, in spite of all the good work it had already done, had really only touched the fringe of its possibilities. Lighting engineers would do well, she said, to consult more with the ladies and to pay more attention to their wishes. For instance, she envisaged the time when interior lighting schemes would be so flexible that the housewife would be able to change her lighting scheme as often as she changed the layout of her furniture or her furnishing fabrics. She also appealed for cheaper lighting fittings. Most people used artificial lighting during both their working and off-duty hours and they should be able to get it both efficiently and cheaply.

The North Western Electricity Board, she said, were taking a great interest in the educational work of the I.E.S., and were encouraging students to take the examinations in Illuminating Engineering. They hoped that in this way they would soon have qualified lighting engineers in every district.

Miss Kenyon also paid tribute to Mr. Dow, whom she described as a great pioneer whose work should be carried on with increasing enthusiasm. He had seen the Society grow to the stage where it made a large contribution to the happiness and welfare of people, but she foresaw the time when the Society's membership would be many times its present figure.

After thanking Miss Kenyon for her kind remarks, Mr. J. M. Waldram, who replied on behalf of the I.E.S., said he was pleased that reference had been made to J. S. Dow, to whom the Society was a living memorial. The Society, he said, was in a flourishing condition and was held in great esteem not only in this country but also abroad, where the Transactions had a reputation for sound material.

Amongst the members of the I.E.S. were representatives of many professions, which indicated the wide field covered by its interests.

The toast of "The Guests" was proposed by Mr. F. J. R. Makin, the vice-chairman of the Manchester Centre. In addition to those mentioned above, the guests included representatives of the E.A.W., E.C.A., Institution of Electronics, the I.E.E., the Manchester Architects' Association, the Manchester College of Technology, the Women's Engineering Society, the Liverpool Centre of the

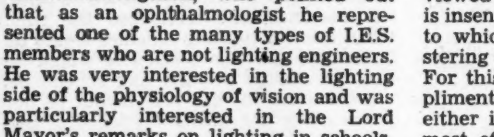
I.E.S., the Electrical Wholesalers' Federation, and the Manchester Federation of Scientific Societies.

The reply was made by Dr. W. J. Wellwood-Ferguson, who pointed out that as an ophthalmologist he represented one of the many types of I.E.S. members who are not lighting engineers. He was very interested in the lighting side of the physiology of vision and was particularly interested in the Lord Mayor's remarks on lighting in schools. He thought that more ophthalmologists should be included in the Society's membership, and he recalled that at the recent I.C.I. meeting in Paris, though he had been the only ophthalmologist in the British delegation, he had been unable to contact any similar representative from other countries.

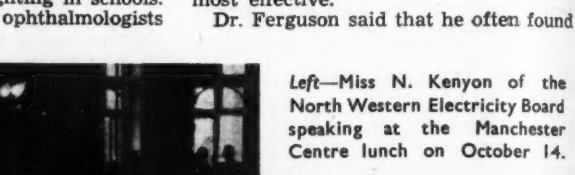
Later on the same day the Manchester Centre held their first meeting of the new session, when a lecture on "Colour" was given by Dr. W. J. Wellwood-Ferguson, the well-known ophthalmologist.

After dealing briefly with colour perception he explained how prolonged exposure to a light of a particular colour induces temporary fatigue to that colour with the result that if a white surface is viewed immediately afterwards the eye is insensitive to the parts of the spectrum to which it has become fatigued, registering only the complimentary colours. For this reason the careful use of complimentary colours in close proximity, either in pictures or decoration, can be most effective.

Dr. Ferguson said that he often found that people were confused by the fact that a mixture of the primary pigments gave a resulting colour of very dark brown or black, whereas a similar mixture of the primary colours of light resulted in white. He explained this very simply by pointing out that each pigment absorbs all the colours in the incident light but its own, and therefore when the three pigments were mixed together each one absorbed the light which would otherwise have been reflected by the others, so that the whole of the light was absorbed. Whereas in the case of



Left—Miss N. Kenyon of the North Western Electricity Board speaking at the Manchester Centre lunch on October 14.



Right—The I.E.S. President, Mr. J. M. Waldram speaking at Manchester. On his right are Mr. H. Atherton, Chairman of the Centre, and the Lord Mayor of Manchester.

the mixture of coloured light, whether direct or reflected from a white body, each colour produces its separate stimulus and these stimuli added together give the sensation of white light.

For the purpose of decoration it was as well to remember that warm colours, such as reds, oranges and browns, give a sense of nearness, therefore an apparent reduction in size of a room. Whereas cold colours, blues and purples, give a sense of distance, and therefore, increase in size. Some research has been carried out on the ease of perception of various combinations of colours, and it has been proved for the purpose of such things as printed notices, that black on yellow comes at the top of the list with black on orange as a close second, but yet yellow on black is number 17 on the list and various other combinations in between.

Dr. Ferguson advocated the intelligent and careful use of colour in industry, and felt that there was great scope for improvement in this direction.

In answer to questions raised in discussion after the lecture, Dr. Wellwood-Ferguson said that in his opinion the eye is inclined to tire rather more rapidly under monochromatic light than under white light. Close regular patterns of contrasting colours produced a disconcerting effect on account of the rapidly changing wavelengths and the fact that the colours came to a focus at different depths on the retina. He also said in reply to a question that he knew of no ill effects which could result from fluorescent lighting.

London

At the Sessional Meeting held in London on November 9 a lecture on High Speed Photography was given by Dr. J. W. Mitchell, of the Wills Laboratory at the University of Bristol. The President explained at the beginning of the meeting that a written contribution by Dr. Mitchell on flash discharge tubes as light sources for high-speed photography would shortly be published in the Transactions and would be complementary to the paper given by Mr. C. R. Bicknell earlier this year. For this meeting, therefore, Dr. Mitchell would deal not so much with this type of light source, but with the general principles of high-speed photography. A fuller report on this lecture will appear in a subsequent issue.

Sodium Lighting in Ironfoundries

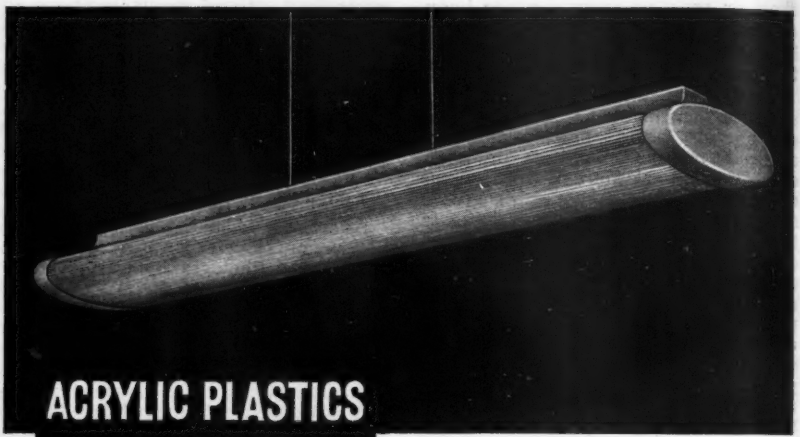
A recent issue of "Ljuskultur," the journal of the I.E.S. of Sweden, contains an article by E. A. Berghman on the advantages of sodium lighting in ironfoundries. It is claimed that the yellow, almost monochromatic light from the sodium lamps eliminates chromatic aberration of the eye resulting in clearer vision with exceptionally good contrast for a reasonably low light output.

In places such as ironfoundries, steel hardening shops, hot process shops, rolling mills, etc., where everything is sooty and black and even the most expensive ventilation plants have been unable to clear the smoke and dust, sodium lighting has proved to be most useful. In ironfoundries, for instance, sodium lighting renders a useful service in making the sand of moulds and cores appear quite bright so that the details in the sand are much more distinct.

In spite of the highly skilled work which is carried out in an ironfoundry the question of adequate and suitable lighting has, according to the author, seldom been given proper attention, and it is stated that many Swedish foundries have lighting which could hardly have been considered good 25 years ago.

When sodium lamps were first introduced into foundries they were used very sparingly with the result that the intensity of illumination was often less than 25/30 lux (2.5/3 l/sq. ft.), which is obviously too low considering the difficulty of keeping fittings and lamps clean. After careful investigation it was found that most satisfactory results were obtained with sodium lamps giving an illumination of 80/90 lux (8-9 l/sq. ft.).

The light lost through dirt on fittings and lamps in an ironworks is difficult to assess, depending as it does to a certain extent in the location and design of the building and the ventilation. Regular cleaning of fittings and lamps has proved difficult to organise. Some foundries have been known to carry out cleaning every six months, but even in that time a very large amount of dirt can be accumulated.



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The above trough panel is machine-fluted PERSPEX acrylic sheet, using ⅛" flutes. Also obtainable in ¼" or ½" between the apices. At each end there could be a band of our Flashed Opal Finish to give greater diffusion and prevent the lampholders being visible. These can be obtained in colours.

OVER 20 FINISHES SUPPLIED

We make :— single moulding reflector up to 5 ft. 9 ins. in length, tubes for mines lighting, street lighting lanterns, including prismatic plates, road signs and Belisha beacons.

X XX

PROTOTYPES OR QUANTITIES

Illustrated :- The ATLAS FM/2080 By :- THORN ELECTRICAL INDUSTRIES LTD.

"TripleX" PLASTICS Fit and be Safe

TRIPLEX SAFETY GLASS CO. LTD. 1 ALBEMARLE ST., PICCADILLY, W.1

The EDITOR Replies

We have been asked whether complaints arise in factories lighted by 400-watt H.P. mercury lamps. These lamps are still widely used, and complaints that they cause eyestrain have recently been made by workers in one factory where the work involves no fine discrimination. Although the illumination is not above 8 lm./ft.^{2}, it does not seem likely that this is so inadequate for the work as to cause true eyestrain. We are inclined to think that the rather depressing appearance of the factory due to low intensity illumination by light of this spectral quality is the real grievance.

Another inquirer asks whether a bank of milling machines, which do not receive adequate daylight, can be lighted continuously by fluorescent tubes without glaring reflection from the work, or other undesirable effects. Of course they can be; there are numerous installations in engineering shops which have proved entirely satisfactory for this purpose.

With the growing interest of lighting engineers in the decoration of the interiors they have to light—paralleled as it is by the interest of lighting consumers—the effect of illumination levels, as well as of the spectral quality of the light, upon the appearance of coloured surfaces, and their aesthetic value, is the subject of inquiries from time to time. In this connection it is recalled that the daily Press, quite incidentally, pointed out the importance both of a high level of illumination and of light which is not too weak "in the red" if the most pleasing colour rendering is to be obtained. This reminder occurred in the report of the opening of the Olympic Games by H.M. The King at the end of July. Immediately after the Games were declared open the sun was temporarily obscured, and the reporter wrote, "And then came the cloud. For nearly a minute it blotted out the sunlight and *dulled the colour* of the uniforms of the 6,000 Olympic athletes who stood behind their flags on the playing-field." In striving to achieve good colour rendering by artificial light, the spectral composition of the light is clearly a matter of special concern, though the importance of providing a liberal amount of light should not be under-estimated.

Apropos the use of colour in factories, an experimentalist in this field has reminded us that a colour scheme which may appear admirable to the casual visitor, or the non-industrial "colour expert," may be anything but pleasant to the workers who have to live with it. Moreover, it may even camouflage some things the occupants need to see. Just as a careful analysis of the workers' visual tasks is of the first importance if proper lighting is to be designed, so it is in planning colour schemes. In addition to this, it should always be borne in mind that colours which are quite agreeable on small surfaces are not necessarily so on large surfaces, and, also, that colours pleasing to the eye for short periods may be unwelcome as constituents of an habitual prospect.

We have been asked how opticians' sight-testing rooms should be lighted. General lighting is not needed for retinoscopy and a usual practice is to arrange a special lamp behind and to one side of the patient's head, so that light is received on the ophthalmoscope mirror, from which it is reflected into the eye to be examined. An alternative

method of illuminating the interior of the patient's eye is by means of a small light source contained in the ophthalmoscope itself. For testing the patient's visual acuity, however, as well as for detecting astigmatism and anomalies of colour vision, charts have to be illuminated, and the patient's vision will be rated too low if the charts are poorly illuminated. Some years ago the level of illumination recommended for Snellen test types was 10 lm./ft.^{2}, but this recommendation does not appear to be generally known, and we have recently found it stated by more than one oculist that the illumination should not be less than 3 lm./ft.^{2}. In the U.S.A. it has been recommended that Snellen test charts should have an illumination of about 100 lm./ft.^{2} and, since it is now well known that maximum visual acuity may not be manifest even with this illumination it does not seem to be an unreasonable recommendation.

It is, however, obviously desirable that the illumination of test charts should be standardised, and there is ample justification for suggesting that the value adopted should not be lower than 20 lm./ft.^{2}. The general illumination of sight-testing rooms, while the charts are being read, should not be much lower than the illumination on the charts themselves, and good general illumination is necessary, in any case, to enable the optician to make his records and read his instruments.

SITUATIONS VACANT

CROMPTON PARKINSON. LTD., require a fully trained Lighting Survey Engineer to cover London and the Home Counties.—Reply to Chief Personnel Officer, Astor House, Aldwych, W.C.2.

EXPERIENCED LIGHTING ENGINEER, thoroughly conversant with industrial and commercial lighting, required by leading lamp and fittings manufacturers. Excellent prospects either in London or, if desired, overseas. —Write Box No. 784, "Light and Lighting," 32, Victoria-street, London, S.W.1.

B.T.H. Research Laboratories

(*Continued from p. 237*)

organised and for inviting the I.E.S. to visit the laboratories. In reply Mr. Davies said that he was very pleased to welcome the I.E.S. and hoped that they would come again.

The party were then taken by coach to see some six miles of fluorescent street lighting which has been installed in Rugby. The majority of the installation is of three lamp lanterns at 150 ft. spacing and a height of 25 ft. No doubt this extensive installation will provide some very useful data on this method of street lighting.

'Light in the Home'

A very attractive and well-illustrated booklet with the above title has just been issued by the Lighting Service Bureau. The inside cover of this booklet bears a quotation from the speech made by the Rt. Hon. George Tomlinson, at that time H.M. Minister of Works, at the I.E.S. Convention Dinner in 1946, in which he said: "I maintain that most people are miserable when they have to live in a poor light, and there is certainly a need for well-lighted homes. Just as the sunshine opens the flowers and brings smiles to the faces of the people, so a well-lighted home has the same effect upon individuals in making them cheerful and happy." This booklet shows a number of ways, some of which it is admitted are not new, in which homes can be made more cheerful by giving a little attention to the lighting.

All Done by Mirrors

Quotation from an article in the I.E.S. Lighting Review (Australia).

"We don't want to be misunderstood: we like mirrors . . . if only they are planned for more than their own intrinsic decorative effect, as part and parcel of the general interior design. For, every time we look at a mirror we see into the mirror as well, and find there, by physical necessity, a reflected picture which changes with our every movement. No wonder that we lighting men feel somewhat frustrated when we see mirrors reflecting the very objects which we tried so valiantly to hide from view.